Incorporating "The Illuminating Engineer."

Light and Lighting

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Born in the Black Out

LIGHTING is under a Cloud. We have scarcely any light out of doors. What we have indoors must be hidden from view. One incidental benefit of the early adoption of summer time and the extension of the hour at which the black out commences is the creation of a brief evening period during which full shop window lighting may be seen once more.

Singular that under such conditions new marvels in lighting equipment should make their appearance. On page 51 we record the introduction of a new and highly efficient electric discharge lamp, depending for most of its light on fluorescence and yielding a quality of light closely approaching daylight in colour value. Such a light-source should have many applications — but for the present they must all be indoors.

Equally remarkable — considering the crushing effect of the present lighting restrictions on their application — has been the attention devoted to illuminated signs. Here, again, fluorescence is likely to provide novelty, and the difficulty in securing regular supplies of normal materials is leading to experiments with others — for instance, translucent plastics — which may have interesting results in the future.

BI

Maintenance of Factory Lighting

At the third meeting of the North Midland Centre, held in Leeds on February 12, Mr. J. W. Howell, the chairman, introduced Mr. H. Fletcher, engineer of one of the largest wholesale clothing manufacturers in the world, who gave a talk on maintenance. In his opening remarks Mr. Fletcher recalled the address he gave on this topic before the Society in London some time ago. He had since discovered that the problem was more intricate than he had at first thought, and that reliable data could only be obtained over long periods. In the works with which he was concerned fittings received attention at intervals of not more than fourteen days, and reflectors and diffusers were washed every four months. (Graphs showed that as much as 31% of the light might be lost during the life of a lamp owing to inattention.) A special staff operating for about 11 hours per week at times when machines were stopped was maintained for this purpose. The following analysis of costs was presented: Wiring (25-30 years' life), 8%; Fittings (10 years' life), 23½%; Cleaning, 18%; Lamp Renewals, 19%; Current, 31%. As a result of long continued experiments lamps were now run at 3½% above rated voltage. Replacements were not materially affected.

Some interesting points were raised in the discussion. In response to inquiries Mr. Fletcher stated that whereas previously lamps had been regularly replaced after 1,000 hours they now awaited failure before replacing. The voltage was raised by booster transformers. The smaller wattage lamps, however, would not stand being over-run. He had only replaced 1,658 out of 1,669 lamps during the expected period, which was considered a satisfactory result. The proportion of lamps broken during cleaning was small. In view of the nature of the operations in the factory and the regular cleaning no special paste or abrasive powder was necessary—though there was in fact a good deal of dirt that needed removal. The use of illuminations as high as 30 ft.c. in the other factory at Bolton had not created a demand for a similar level at Leeds. The management would prefer to have a higher value, but at present the installation cost did not allow of this.

Other questions related to the use of "needle-light illumination." One speaker mentioned a Gateshead factory where operatives had insisted on the provision of this system. Mr. Fletcher mentioned a difficulty that sometimes arose with general lighting—that workers became used to a certain machine and were uncomfortable at an adjacent one, where a slightly different position of the head was assumed. He had found, however, that when needle-light illumination was furnished the general illumination could not safely be reduced.

In reply to numerous other queries Mr. Fletcher explained that the voltage was adjusted to give 3½% excess at the local distribution board—the excess being above the rated voltage of the lamps not above the incoming supply. In some cases an increase up to 17 volts was necessary, owing to long runs to distribution boards. The range of excess covered by experiments was 7½%, and it had been determined that the value of 3½% was the greatest excess that would not create burning-out difficulties.

[One would like to have confirmatory experience from other quarters as to the desirability of over-running lamps in practice. Our attention was recently drawn to a case of a consumer located near the local power station whose lamps have been continually failing, and who is accordingly now proposing to *under-run* lamps by about 4%. It is, we believe, established that a 5% increase in voltage approximately halves the life of ordinary service lamps—if so, over-running is evidently a device to be used with discretion.—ED.]

I.E.S. Midland Centre Gets Going

The Midland I.E.S. Local Centre is now getting into its stride again. On March 1 members and friends assembled for an informal dinner in Birmingham, over which Dr. F. S. Ette, the Chairman of the Centre, presided. The President of the Society (Mr. F. C. Smith) and the Hon. Secretary (Mr. J. S. Dow) attended from London. The former delivered a brief but eminently suitable address, in which he gave some little account of recent work in London and congratulated the Centre on getting going again, which was received with acclamation. There was a long and varied programme, for which Mr. A. E. B. Wallis, the hon. secretary, and Mr. C. J. Allderidge were mainly responsible. Mr. Wallis also repeated (with embellishments) the musical turn with tubular lamps which was a feature at the similar gathering last year. Earlier in the evening the visitors from London had a useful opportunity for interchange of ideas with some of the members of the local committee. It was also pleasant to meet again Mr. F. Walker and Mr. C. S. Caunt, respectively chairman and hon. secretary of the Nottingham sub-centre.

"Planned Lighting for Seeing"

It was mentioned in the course of the evening that several meetings are being arranged in the near future, including one at which Mr. Howard Long's paper on "Planned Lighting for Seeing" will be presented. In his address on this subject given to the Nottingham Sub-Centre on February 9, Mr. Long reviewed the method of appraising the lighting requirements of any process originally proposed by Mr. A. W. Beuttell. He discussed in turn the following items, all of which contributed to the general effect: Diffusion, Glare (direct), Shadow, Movement, Adaptation, Diffusion and Shadow, Glare (reflected), Colour, and Contrast. Although the audience was not very numerous there was a keen discussion, which was opened by Mr. T. E. S. Thwaite. The Chairman (Mr. F. Walker), in complimenting Mr. Long on his paper, recalled the great assistance which he had rendered in initiating the formation of this sub-centre.

A.R.P. Lighting

I.E.S. Meetings in Glasgow and Nottingham

Useful opportunities of making known recent work on A.R.P. lighting were afforded at the I.E.S. meetings in Nottingham (January 12) and Glasgow (February 16), which were visited in turn by the President (Mr. F. C. Smith). In the addresses he delivered at these centres Mr. Smith reviewed work on A.R.P. lighting being done by the various sub-committees (about twenty-four in number) in London, in the course of which he paid a tribute to the enlightened attitude of the officials at the Ministry of Home Security in seeking and making full use of the expert advice of members of the Society. He emphasised their desire to give every possible amenity to the public consistent with meeting defence requirements. A gracious reference was also made to the part played by the immediate Past President, Mr. P. Good, in initiating and organising this work. In all this work the laboratories associated with the leading firms and organisations in the gas and electricity industries had worked together and shared in research.

As instances of work undertaken, Mr. Smith mentioned researches on fittings to furnish low illuminations, the comparative value of blue and white light, light locks, luminescent materials, complementary lighting, signs and shop window lighting, and war-time street lighting. British Standard Specification dealing with a number of these subjects had been issued. The specification on war-time street lighting (BS/ARP 37) was discussed in special detail. The principles underlying it were explained, and it was pointed out that even the very low illumination afforded (0.0002 ft.-c.) had a definite amenity value.

Mr. F. Walker presided over the meeting on January 12, which took place in the Demonstration Theatre of the City of Nottingham Gas Department. Mr. T. E. Ritchie also travelled up from London to attend the meeting. Following the President's address a paper was presented by Mr. J. Bertram on "The Utility Value of Low Levels of Illumination." The discussion was opened by Professor H. Cotton, who made reference to the problem of lighting public vehicles. Mr. Howard Long pointed out the value of uniformity in rendering weakly illuminated areas inconspicuous to aerial observation, and urged that the need for adequate levels of illumination in working areas should not be disregarded. The possibility of using reduced voltages to achieve low intensity street lighting, the choice of lamps to give the best results, and the fact that different units had been produced by various firms to give the same result, were among the matters discussed. Expressions of thanks to the President and Mr. Ritchie and to Mr. Geo. Dixon for placing the lecture theatre at the disposal of the Society terminated the meeting.

The meeting in Glasgow on February 16 was presided over by Mr. E. J. Stewart, and the President's announcement that Mr. Stewart has just been invited to accept nomination as a Vice-President of the Society was received with acclamation. The audience, which approached 200, contained representatives from numerous local authorities interested in the war-time street lighting, a number of whom took part in the ensuing discussion.

Arrangements were made for specimens of war-time street-lighting units, both gas and electric, to be on exhibition in the lecture theatre, and visitors also had the opportunity of inspecting streets in the vicinity of the meeting place in which war-time street lighting had been installed.

Ventilator Light Traps

Summary of an Address given by Mr. E. W. Murray to the Industrial Welfare Society

In an address given to the Industrial Welfare Society at a conference held at the London School of Hygiene and Tropical Medicine on January 31, Mr. E. W. Murray recalled that the restrictions on lighting order issued under the Civil Defence Act requires, in so many words, that no light inside a building shall be visible from outside. There had, however, also been a suggestion that it did not mean that a private house, for instance, must necessarily look as though it was uninhabited.

The methods in general use to obtain this obscuration, Mr. Murray added, were now fairly well known. The easiest way of dealing with the subject was to block out or black out every window and other opening in the outside walls or roofs. Unfortunately, the ventilation of the chamber may then be affected adversely. As the result of inquiries put to them the Joint Committee formed by the Ministry of Home Security, on which the Illuminating Engineering Society is represented, was asked to provide some information as to how to obtain the best ventilation in the black-out.

The information given in the address would, it was expected, be incorporated in one of the series of BS/ARP specifications. The designs described must be considered as representing types of ventilators, and such designs should be used as an idea for incorporating into some opening, whether it be a window or an opening in a wall or roof, to obtain ventilation coupled with efficient light obscuration.

Primarily, Mr. Murray pointed out, it must be understood that the provision of a light trap to a ventilator will generally decrease the ventilation, because the arrangements of the light trap are practically certain to increase the resistance to the passage of the air through the trap and ventilator, as compared with a free opening of the same size. The ventilating engineer refers to this as an increase in the water gauge pressure across the trap and ventilator. In general, the provision of a light trap to some window or other form of opening which acts as a ventilator reduces the effective opening to approximately one-half. Therefore, to ensure the same degree of ventilation as obtained before the black-out two windows or other ventilation openings should be fitted with a ventilator light trap. Similarly, where mechanical ventilation with a light trap is used, viz., propeller fans, an increase in speed would be necessary if the maximum output of the fan was needed to provide adequate ventilation without the light trap.

On the other hand, mechanical ventilation by means of a cased fan and ducts would not call for the provision of light traps.

There may be instances where these ventilator traps are used as a natural means of exhaust for steam, dust, or mist, and it is quite possible that some extra treatment may be required to render the ventilator an efficient light trap. An additional baffle plate inside or outside the ventilator, or, in some instances, suitable screening of the nearby lights, may reduce the illumination, and hence the reflection of light by the steam, dust, or mist.

The lecture was illustrated by lantern slides showing various forms of ventilator light traps.

"The Quality of Lighting"

The picture at the head of the column shows Dr. Halbertsma delivering the lecture. In the foreground of the picture may be seen Mrs. Halbertsma and Miss Halbertsma, and, in uniform on the other side of the hall, his eldest son—and also his second son, who, we gather, rivals Dr. Halbertsma himself in stature.

In a recent issue (January, 1940, p. 3) we reproduced a picture of Dr. N. A. Halbertsma, taken immediately after the delivery of his inaugural lecture on "The Quality of Lighting" at Utrecht University. In what follows we give, as then promised, a summary of the address.

In this lecture Prof. Halbertsma referred to the influence of the development of light sources and of the available measuring instruments on the conception of quality of lighting.

Attention centred upon the efficiency of the light sources only as long as this was still very low. Afterwards, when portable photometers were introduced, the quality of lighting was judged by the illumination values. Reading tests at that time were considered to be a severe visual task. 1.5 foot-candles had been officially prescribed in 1909 for factory lighting in Holland, and 3 foot-candles for fine work and for shops in which women and children were employed!

A considerable change occurred about 1920; the physiology of seeing coming to the foreground the importance of contrast sensitivity and of glare were studied and the results applied to lighting practice. Much larger values of illumination have been advocated since, but they are merely one of the factors determining quality of lighting. Shadows, highlights caused by specular reflection, direct and indirect glare, can be just as important.

At present the subdivision of lighting installations in direct, semi-indirect, and indirect lighting seems rather crude, and other ways are looked for to characterise the lighting effect. In order to adapt the lighting to specific tasks local lighting is again being applied in addition on a larger scale for high quality lighting; these modern local lighting fixtures, however, are not just a lamp and a shade as formerly used, but they are now adapted to a special task, sometimes by giving direct lighting, sometimes by semi-indirect lighting, and sometimes by producing indirect lighting. In this way high illumination values, up to 100 and 200 foot-candles, are obtained at a low cost and without undue glare or heat-production.

Instruments have been developed in an effort to measure the quality of lighting. Because illuminating engineering, according to H. E. Ives, is "the art of the proper distribution of brightness," such instruments as the new brightness-meter of Luckiesh-Holladay, with its range from 1 : 7,500,000, may become just as popular as the photo-electric foot-candle meter. For the direct measurement of the chief factor governing the quality of lighting visibility-meters have been devised. As the influence of the surroundings on the lighting conditions of the field of the visual task is now well recognised, it is necessary, of course, to include these surroundings into the field of the visibility-meter.

At the end of his lecture Prof. Halbertsma referred to the present-day outdoor-lighting conditions in a considerable part of the world, where good vision at very low brightnesses is wanted. All knowledge accumulated of the functions of the dark-adapted eye has now to be put to practical applications. Here, too, quality will be the deciding factor instead of quantity.

Reviews of Books

Vocabulary of Terms connected with Illuminating Engineering (Benamingen op het gebied der Verlichtingskunde) in five languages (Dutch, English, French, German, and Esperanto). (Edited by the Secretary of the Dutch National Committee on Illumination, Utrechtscheweg 210, Arnhem, Holland. pp. 120; price 2 guilders.)

The Dutch National Committee on Illumination has just published a Vocabulary in five languages, entitled "Benamingen op het gebied der Verlichtingskunde." The committee had the assistance of several Dutch scientists, and the translation into foreign languages was supervised by foreign specialists in illuminating engineering.

The Vocabulary contains more than 700 terms in the field of illumination with a definition, and, where necessary, a short explanation in Dutch. Translations of all the terms in English, French, German, and Esperanto are given. The terms are divided into sixteen groups dealing with such subjects as Units and Definitions, Properties of Radiation, Visual and Physical Photometry, Vision, Glass, Signal Lights, etc., etc.

An alphabetically arranged index is given in each language so that reference is made easy. The Vocabulary represents a very creditable piece of work by the Dutch committee, and should prove of interest and use to others besides the Dutch illuminating engineers for whom it is primarily intended.

Obituary

Louis B. Marks

We must plead the combined effect of war-time distractions and delay in the receipt of information from abroad for our omission to record the recent death of Mr. Louis B. Marks, the first president of the Illuminating Engineering Society in the United States. In 1905 he was one of the original founders of that society, for which he had a long period of distinguished service. He acted on numerous committees, and was closely associated with the initiation of lighting codes, being one of the pioneers in connection with the movement for lighting legislation. During the World War he served as an expert on illumination with the U.S.A. Navy Consulting Board, and he subsequently represented the United States Government at the International Exhibition of Decorative and Industrial Art, in Paris. Mr. Marks carried on a consulting practice for many years, and it is noteworthy that a considerable part of this consulting work was associated with schemes of natural and artificial lighting. He was responsible for the lighting systems of many important buildings, and, even in the early stages of illuminating engineering, his name was quoted as one of the very few eminent independent professional experts in this field. Mr. Marks was a member of many other scientific and engineering bodies. He was the last survivor of the small band of distinguished experts abroad who were created honorary members of the British I.E.S.

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Light Locks at Entrances to Buildings*

In what follows we give a summary of the new edition of BS/ARP 15, which now appears under a new title ("Light Locks at Entrances to Buildings"). The scope of the Specification has been widened, so that it now applies not only to shops but to buildings generally. In order to meet the requirements of certain problems, some modifications of the original design of light lock are suggested. A summary of the first edition of the specification appeared in *Light and Lighting* last year (September, 1939, p.188).

ESSENTIAL FEATURES

The essential features of the "light-lock," which affords a means whereby persons may enter or leave premises during periods when all outdoor lighting is diminished to a minimum and when no visible light must emerge from the interior, are shown in Fig. 1.

The light-lock consists essentially of a passage or tunnel having dark walls and ceiling, so constructed that (a) No direct light from sources, or light therefrom undergoing specular reflection from polished surfaces, is visible at its exterior entrance, (b) The passage-way is not less than 2 ft. 3 in. wide.

In the type of light-lock shown in Fig. 1, all direct light passing through the inner entrance undergoes double reflection from its walls. Where, however, this construction presents difficulties, double reflection may be dispensed with and a simpler arrangement adopted, provided that any sources of light in the vicinity of the inner entrance are suitably screened.

TREATMENT OF INTERIOR.

The walls and ceiling of a light-lock shall be painted a dull black. Where pedestrian traffic is being served, a white line 2 in. wide shall be drawn horizontally and continuously along the walls at a height of 3 ft. 6 in. The floor may be in any dark material which does not take a polish. The walls shall extend completely up to the ceiling of the lock. Where a step occurs at the entrance its edge shall be a matt white, and a cautionary notice, also in white, shall be marked on the floor just inside the entrance.

In the case of entrances to small buildings (e.g., shops), in frequent use by pedestrians the standard type of light may be used with various modifications and may be of the double type (illustrations of such locks were furnished in the original specification). Where a small encroachment on the space outside is permissible such a device as that illustrated in Fig. 2 may be adopted.

ARCADE LOCKS.

Where a number of entrances, in frequent use by pedestrians (e.g., a row of shops), is found, the light-locked space may take the form of an arcade (see Fig. 3), which should be of sufficient dimensions to allow persons to pass freely to and fro. The width of the arcade should preferably not be less than 8 ft., which may, however, be diminished when arcades can be adapted to one-way traffic. Normal lighting may be provided within the arcade and illuminated windows are permissible.

OUTSIDE BAFFLES.

When light-locks cannot be conveniently arranged inside the exit door a simple baffle arrangement opposite and within the doorway may answer, or a form of external device with a baffle at each end (see Fig. 4) may be adopted.

This device should be portable and should be roofed in but open on the side facing the factory door. It may thus be removed during the day and wheeled into position, covering the factory door by night. The width of the passage should not be less than the width of the exit doorway and it should extend a distance of not less than twice the width of the exit door on either side of the doorway. The interior should be painted dull black but arrows indicating the direction of movement should be painted in white on the wall facing the exit. The effectiveness of the arrangement is considerably increased when a short darkened passage within the factory and leading to the exit door can be provided. It is desirable, in any case, that no direct light should emerge through the exit door.

EMERGENCY EXITS.

Light-locks involving obstruction to direct passage of the public are undesirable in the case of emergency exits. In such cases (*a*) All direct light should be shielded from the exit; (*b*) Passages leading to exits should be lighted as dimly as possible consistent with safety, and the walls adjacent to the exit should be painted with a dark matt paint; (*c*) In other cases a tunnel of matt black material of a length not less than twice the width of the doorway should be constructed immediately inside or outside the exit doorway.

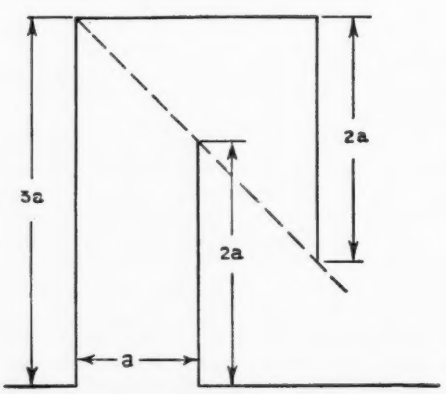


Fig. 1. Essential features of standard light lock, single type.

LUMINOUS SIGNS.

In cases where illuminated signs are permissible, letters or symbols may be cut or otherwise made in the wall of the light-lock. These openings should be made under expert supervision and covered with

*Prepared under the ægis of a Joint Committee of the Illuminating Engineering Society and the Ministry of Home Security (A.R.P. Department). Published by the British Standards Institution (28, Victoria-street, London, S.W.1). Price 6d., post free 8d.

translucent diffusing material, and should be so placed that they receive light from the inside of the building and are visible from the outside. The restrictions of the lighting order must be observed.

Sources of light in the immediate vicinity of entrances should be shielded. This is also expedient with a view to lessening the contrast between the bright interior lighting and the very subdued brightness within the lock, and thus aiding the adaptation of the eyes.

SPECIAL DEVICES.

Occasions arise when some other special means of blocking out emergent light must be contrived. Instances are afforded by garages and van docks into which motor and other vehicles of varying sizes are constantly entering. In some cases it can be arranged that all vehicles pass through a species of light-lock or through a long covered passage which has an equivalent effect. Examples of such cases are illustrated in Figs. 5 and 6.

The following are some examples:—

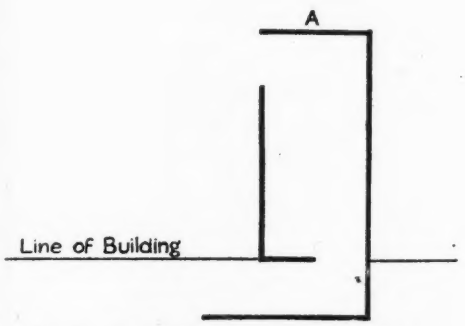


Fig. 2. A simple form of light lock partly encroaching on the pavement. (N.B.—If sources of light adjacent to the inner entrance are suitably screened, so that no direct light enters the lock at this point, the innermost baffle (A) may be dispensed with.)

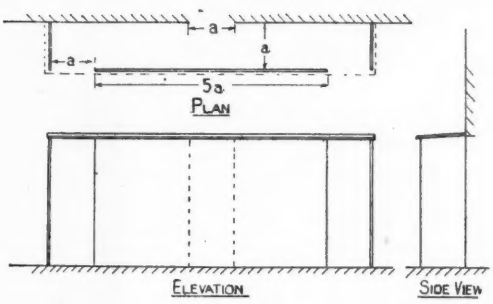
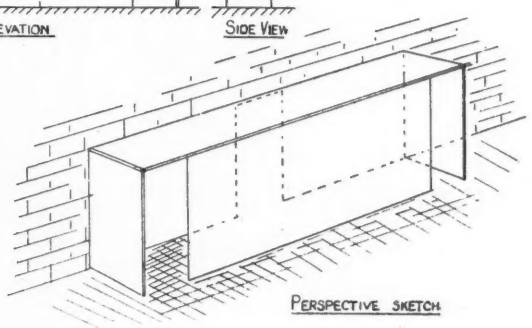


Fig. 4. Movable light locks.

Suitable for factory entrances, etc.



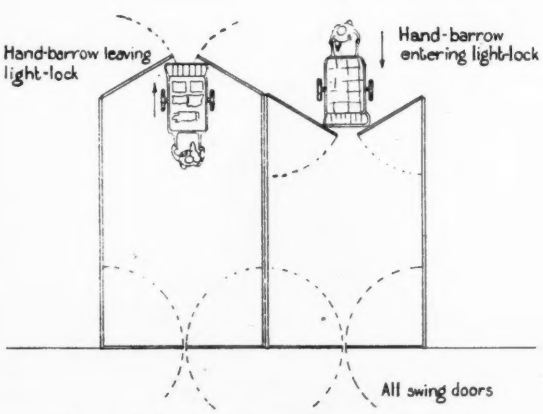


Fig. 5. Swing doors for passage of hand trucks.

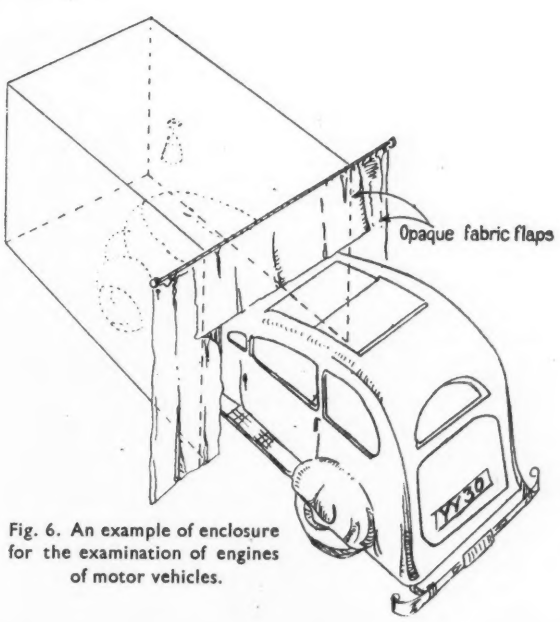


Fig. 6. An example of enclosure for the examination of engines of motor vehicles.

Specimens of Modified Light Locks (BS/ARP 15)

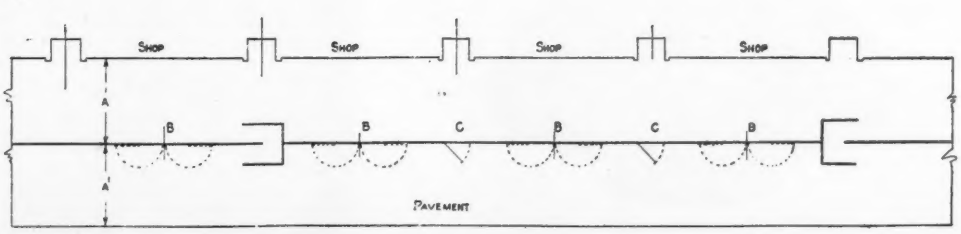


Fig. 3. Arcade light locks for multiple entrances.

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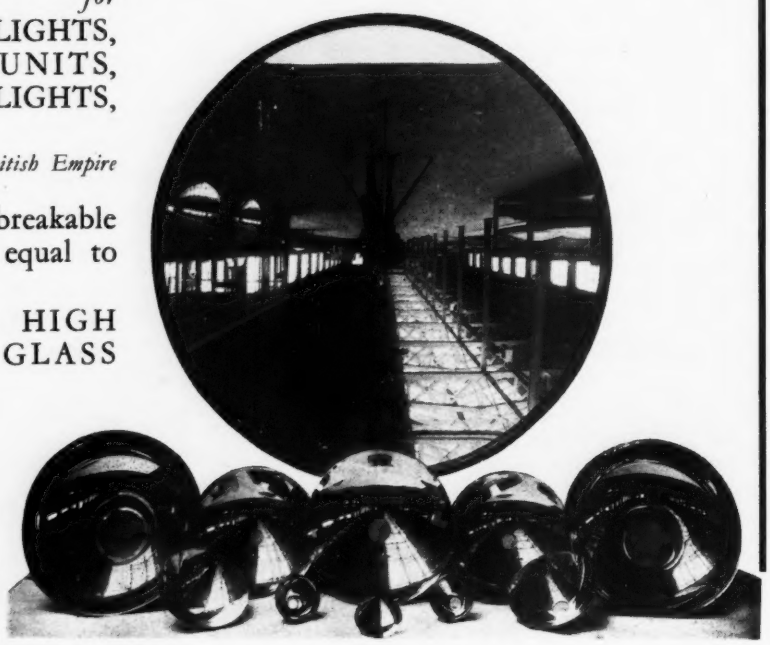

I.P.S. P.13885

War Time Street Lighting

Siemens and Metrovick Fittings

We are pleased to record two additions to the list of war-time street-lighting units (furnishing 0.002 ft.c.) available.

We illustrate below the new Siemens fitting which utilises a standard 12" diam. R.L.M. fitting, stove enamelled black inside and outside, carrying an annular mask designed to produce the desired distribution of light. The exterior of the mask and the interior of the bottom portion are stove enamelled black. The cylindrical upper portion is stove enamelled white inside.

In the design of this unit the aim has been to produce the requisite effect through the medium of large areas of low brightness. Thus the reflector is flashed to a depth of about 2¼ inches from its lip, whilst a reasonably broad ring of light is emitted from the slot in the mask. As a result the fitting appears "alive," and creates the impression, doubtless highly desirable in the present circumstances, of furnishing more light than is actually the case!

The portion of the mask below the slot is, in effect, a cup which can be wholly detached for cleaning, without the complete removal of any nut or stud being involved.

We understand that these Siemens A.R.P. street lighting fittings carry the approval mark of the B.S.I. Supplies are now available.

Siemens A.R.P. street lighting fitting.

Metrovick A.R.P. street lighting unit.

Metropolitan-Vickers have received B.S.I. sanction for the new "starlight" street lighting fitting illustrated above. This fitting is neatly constructed with a light cast canopy and bottom disc, while the body is a single pressing. Two brass thumbscrews permit easy lamp replacement.

In view of the small amount of light permitted, it is important that the fitting shall not deteriorate in use. Special care has been devoted to this point in the Metrovick fitting, and any possible clogging of the fine mesh inside owing to dust or small insects has been prevented by means of a small glass cylinder held between two rubber sponge gaskets.

Samples of all fittings manufactured are inspected at the factory to ensure not only that they fall within the limits allowed by BS/A.R.P.37, but also to ensure that the light distribution in all directions approaches the maximum output allowed.

Electrical and mechanical adaptors of all types are available, including adaptors to permit fixing to existing lanterns. Weatherproof cast canopies drilled and tapped for conduit entry can also be supplied.

Under normal conditions, your lighting was adequate for night-work. But having met the requirements of the "black-out," are you still satisfied that the plant is sufficiently well lit?

There is no need to point out to you that poor lighting means a slowing down of production, a tendency to develop faulty workmanship, and the risk of accident and breakdown.

If you have any doubts about the lighting, why not invite our lighting experts to consider the matter with you? The whole of the Crompton organisation has been tuned to meet the unusual problems created by the present emergency, and our technicians are usually able to suggest plans that not only increase lighting efficiency but which also cut down current consumption.

It is well, too, to remember that worn-out lamps substantially increase overhead costs and that when replacing it pays to specify Crompton, no matter what type of lamp is needed.

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Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from page 26, February, 1940.)

II.—PHOTOMETRY.

56. Cell Distribution Photometer.

Anon. Magazine of Light, IX., pp. 38-39. January 25, 1940.

A detailed description with a photograph is given of a semi-automatic photo electric distribution photometer, based on similar apparatus developed in England. C.A.M.

57. A Light Regulator.

Britton Chance. Electromics, 13, No. 2, p. 24. February, 1940.

The author describes the use of a p.e. cell to control the accuracy of photometer indications by monitoring the light intensity. The apparatus was developed in connection with measurements on a photo-electric photometer, developed for measuring small or rapid changes in light absorption. S.S.B.

58. A Street Lighting Evaluator.

K. M. Reid, H. J. Chanon. Illum. Engineering, I., pp. 72-81. January, 1940.

An apparatus is described which is claimed to give a measure of relative visibility in lighted streets. J.S.S.

59. Distribution Curves.

R. F. Cissell. Magazine of Light, IX., pp. 35-38. January 25, 1940.

Polar curves of light distribution are discussed, together with a simple method of obtaining such a curve with a photo-electric illumination meter. The complete development of the results into a computation of total luminous output of a fitting by means of zonal factors is also given. C.A.M.

III.—SOURCES OF LIGHT.

60. 100 Watt Sunlight Lamp.

Anon. Magazine of Light, IX., pp. 31-32. January 25, 1940.

Details of a new 100 watt "Sunlight" lamp, together with the fitting in which it is used, are given with a photograph. C.A.M.

61. Fluorescent White Light.

J. N. Aldington. Elect. 124, p. 122. February 16, 1940.

A brief summary is given of a recent paper by the author on thirty-six inch 25 watt mercury vapour discharge lamps. The activating radiation, consisting largely of a wave length of 2537 A.U., was produced by the discharge, and was converted into luminous radiation by the fluorescent coatings on the glass. Some control was possible on the degree of warmth of the colour of the light. C.A.M.

62. Fluorescent Lamps and their Applications.

A. B. Oday. Illum. Eng. Soc. Trans., 10, pp. 1165-1188. December, 1939.

Details of available 15 watt, 20 watt, 30 watt, and 40 watt tubular fluorescent lamps are given, with operating data and recommendations for suitable fittings. J.S.S.

63. Artificial Daylighting Studies.

Dorothy Nickerson. Am. Illum. Eng. Soc. Trans., 10. pp. 1233-1253. December, 1939.

The merits for the classification of cotton goods of tungsten filament lamps with filters, carbon arc lamps, carbon dioxide and fluorescent tubular lamps are discussed. J.S.S.

IV.—LIGHTING EQUIPMENT.

64. New Electrical Products.

Anon. El. Rev., Vol. CXXVI., No. 3249, p. 251. March 1, 1940.

Descriptions are given of two new A.R.P. street lighting fittings. R.G.H.

65. The Mechanics of Light Flux Control by Plastics.

M. H. Bigelow. A. F. Wakefield. Am. Illum. Eng. Soc. Trans., 10, pp. 1189-1198. December, 1939.

Data are given on the reflection and transmission of various plastics suitable for use in lighting fittings, but it is pointed out that the use of these plastics is limited to units with a low operating temperature. The optical properties can be controlled by the choice of pigments embodied in the material. J.S.S.

66. A Non-Intermittent Motion Picture Projector.

F. Ehrenhaft and F. G. Back. J. Soc. Mot. Pict. Eng., Vol. XXXIV., No. 2, p. 223. February, 1940.

An improved non-intermittent projector is described, in which a twelve-sided glass prism rotating between the film and projection lens provides the optical compensation. The advantages of the projector are stated to be longer life for the film stock and greater ease of sound reproduction. R.G.H.

V.—APPLICATIONS OF LIGHT.

67. Progress and Development During 1939.

H. W. Richardson. G.E.C. Journal, XI., pp. 3-5 and pp. 18-24. February, 1940.

Progress in lamps and lighting during 1939 is discussed in detail. In applications, street, industrial, and decorative lighting are dealt with, while developments on lamps include those of the sodium, A.R.P., bi-post, and tubular fluorescent types. C.A.M.

68. The Year's Progress in Illumination, 1938-1939.

Illum. Engineering I., pp. 33-71. January, 1940.

A comprehensive summary of American developments in lamps, equipment, and technique during the past year. J.S.S.

69. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans. (now "Illuminating Engineering"), 10, pp. 1129-1134. December, 1939: I., pp. 13-18, January, 1940.

Some representative architectural lighting schemes are described with photographs. J.S.S.

70. Seeing at Night.

R. G. Hopkinson. El. Rev., Vol. CXXVI., No. 3249, p. 241. March 1, 1940.

The response of the eye under the feeble illumination of black-out conditions is different from its response under normal conditions. Some of the factors that govern night vision are treated briefly. R.G.H.

71. Summary of Researches Involving Blink-rate as a Criterion of Ease of Seeing.

M. Luckiesh, F. K. Moss. Illum. Engineering, I., pp. 19-32. January, 1940.

Tests with 307 observers show that the rate of blinking is a sensitive criterion of visual effort, and the results agree closely with determinations using other experimental methods. J.S.S.

72. Lighting in Wartime.

N. I. B. Harrison. El. Rev., Vol. CXXVI., No. 3246. p. 155. February 9, 1940.

A summary is given of equipment available for wartime lighting. Designs of light-traps are discussed, and the use of fittings complying with the various BS/A.R.P. specifications are described. R.G.H.

73. Evaluation of Street Lighting.

K. M. Reid, H. J. Chanon. Am. Illum. Eng. Soc. Trans., 10, pp. 1209-1232. December, 1939.

Data on the reflection properties of two representative road surfaces are given for a wide range of light incidence and position of observer. Laboratory experiments upon a scale model of a street scene are described in which an attempt is made to evaluate visibility with the Luckiesh-Moss Visibility Meter. The effect of fluctuating glare is also discussed. From the data obtained a chart is given, from which, it is claimed, the visibility in any street lighting installation can be obtained. J.S.S.

74. Effective Street Lighting Must Be Planned.

S. R. Williams. Illum. Engineering, I., pp. 82-97. January, 1940.

The planning of a street lighting installation is discussed, with special reference to light distribution and glare. J.S.S.

75. Transatlantic Airport.

Anon. El. Rev., Vol. CXXVI., No. 3249, p. 243. March 1, 1940.

Describes, with photographs, the lighting experiment at North Beach Airport, near New York City. R.G.H.

ENGINEERS!

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● (6) If from any cause, the control equipment should be rendered inoperative with the "on" condition obtaining at the switching units, then, despite the apparent dislocation, the "off" condition can be secured very simply from the central point.

● (7) Should the inoperativeness of the control equipment extend beyond any prospect of prompt repair, it is possible for emergency equipment to be installed and control restored in a few hours.

● (8) Emergency equipment can be permanently installed as a standby duplicate located at some convenient point remote from the service equipment. Should the latter become inoperative, the system of injection permits the substitution of the emergency equipment forthwith.

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76. Greenwich Town Hall.
Anon. El. Rev., Vol. CXXVI., No. 3249, p. 237. March 1, 1940.
Describes, with photographs, the novel lighting installations at Greenwich Town Hall. Indirect general lighting, with louvred direct lighting for committee tables, is a feature of the lay-out. R.G.H.

77. Lighting the Detroit Edison Company Service Building.
H. A. Cook. Am. Illum, Eng. Soc. Trans., 10, pp. 1199-1208. December, 1939.
The layout and equipment for lighting this air-conditioned building are described. The illumination ranges between ten and forty foot-candles. J.S.S.

78. Industrial Lighting.
(*Edit.*). El. Rev., Vol. CXXVI., No. 3246, p. 147, February 9, 1940.
The value of good lighting in industry is stressed. One of its purposes is to safeguard the health and safety of the worker; the other is to improve the quality and quantity of the output. R.G.H.

79. Use Aisle Fixture as Conveyor Light.
Anon. El. World, 113, p. 464. February 10, 1940.
A short description, with photograph, is given of an installation of trough type units, of the type generally used for the lighting of aisles and corridors, applied to the lighting of a conveyor belt in a bottle packing department. Details of the lighting scheme are given. S.S.B.

80. Large Store Installation.
Anon. El. Rev., Vol. CXXVI., No. 3246, p. 149. February 9, 1940.
Describes, with photographs, the electrical equipment of the Birmingham Co-operative Society's new building. Details of the shop-window and architectural lighting equipment and its control are given. R.G.H.

81. Shop Window Lighting.
J. Bernard Harris. Elect, 124, p. 107. February, 1940.
Results are given of illumination values obtained in a photometric test on a regulation box fitting designed for restricted shop-window lighting. C.A.M.

82. Portable and Counter Displays.
C. T. Masterson. Magazine of Light, IX., No. 1, pp. 23-25. January 25, 1940.
Numerous instances are given with photographs of the use of fluorescent tubular lamps in counter displays. C.A.M.

83. Luminous Advertising.
W. M. Potter. Magazine of Light, IX., pp. 26-27. January 25, 1940.
Photographs with detailed diagrams are given of the use of fluorescent tubular lamps in shop facia lighting. C.A.M.

84. Fluorescent for Advertising Value.
Anon. El. World, 113, p. 166. January 13, 1940.
A description is given of the lighting of a large baker's store in America, using the newly-introduced tubular fluorescent lamps in conjunction with normal filament lamps. Special attention has been paid to advertising value of the installation. S.S.B.

85. Cinema Lighting.
Anon. Elect. 124, p. 100, February 2, 1940.
A brief description, with a photograph, is given of a cinema in Stoke-on-Trent in which auto-selective colour lighting equipment has been installed. C.A.M.

86. L.M.S. Electric Trains.
Anon. Elect, 124, p. 91. February 2, 1940.
A brief description, with a photograph, is given of lighting equipment installed in coaches of L.M.S. trains to meet black-out requirements. C.A.M.

87. "All Aboard for 1940."
H. H. Helmbright. Magazine of Light, IX., No. 1, pp. 14-18. January 25, 1940.
Details with numerous photographs are given of the present day trend of railway carriage lighting in America. C.A.M.

BS/ARP SPECIFICATIONS FOR LIGHTING EQUIPMENT

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Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 512,099. "Improvements in or Relating to Electron Discharge Devices for Television Receiving Apparatus."

The Baird Television, Ltd., Denisoff, A. K., and Jones, V. A. Dated April 1, 1938.

This specification refers to television receiving apparatus where a wide homogeneous beam of electrons is modulated from point to point by potentials on a storage grid through which the beam passes on its way to the luminescent screen. It is the object of the invention to improve control of the electron beam and definition of the resultant image by putting the cathode emitting the electrons substantially nearer to the grid than the grid is placed to the screen. The distance advocated between cathode and grid is of the order of 1 mm.

No. 513,149. "Improvements in or Relating to Light Reflectors."

King-Morgan, P. Dated July 18, 1938.

The specification deals with the improvement of fittings, essentially made up of a truncated ring fixed around and close to a light source of the concentrated type as tungsten bulb lamps or gas mantles. The object is to re-direct the emitted light by reflection and to create a converging annular beam for shadowless lighting purposes. To increase the amount of light reaching the ring a lens system is provided between light source and ring. In order to obtain the best effect the reflecting wall of the ring should be arranged at an angle of 40-45° to the base of the cone formation.

No. 513,157. "Improvements in or Relating to Electron Lenses."

Klemperer, O., and Wright, W. D. Dated February 17, 1938.

The specification refers to electron lenses made up of co-axial, cylindrical electrodes. The ratio of their effective diameters is 1.5 : 1 and 2.5 : 1. The smaller diameter electrode is to contain the nearly parallel beam of electrons and is kept at a higher potential than the larger, the ratio of the potentials determining the focusing ratio.

The improvment is aiming at reduction of the longitudinal spherical aberration. It provides for electrodes essentially of the same principle as described above with the same ratio of effective diameters, but the large electrode maintained at the lower potential is to contain the nearly parallel beam of electrons. Provision is also to be made for the divergence of one portion of the beam being equal to the convergence of the other portion of the beam. Another feature of the invention is that both electrodes may be of the same diameter and "the ratio of effective diameters" produced by a diaphragm in between the two. The optimum result was found when the divergent or nearly parallel beam is incident to the low potential side of the lens and the smaller electrode is projecting into the bigger for a length equal the radius of the smaller. Application of the invention to a cathode ray picture scanner for use in a television transmitting system is shown diagramatically.

No. 513,168. "Improvements in or Relating to Supply Systems for Electric Discharge Lamps."

The British Thomson-Houston Co., Ltd. Dated March 27, 1937. *(Convention.)*

The invention relates to discharge lamp systems operated on a.c. To produce flashes equal to the frequency of the supply the discharge lamp—of the cold cathode high pressure mercury type—is put in series with a transformer and the main winding of a reactor. The saturating winding of the latter is fed through a full wave rectifier, parallel to the lamp circuit, from the same system with d.c. Without the inductive means as provided the lamp would give flashes equal in number to twice the frequency of the supply. Here, however, through one half cycle the direction of the current in the saturating winding is such as to increase the flux and cause saturation of the reactor core, consequently the lamp circuit voltage will rise sharply to ignition point. In the second half cycle the reactor core is unsaturated, hence a high impedance to the current flow is created in the lamp circuit and the voltage in the same is insufficient to cause ignition but sufficient to maintain ionisation within the lamp. Application of this principle is suggested in connection with motion picture projectors to dispense with shutter constructions, etc.

No. 513,177. "A Rear Light Indicator or Detector for Vehicles."

Webster, W. J. Dated April 4, 1938.

The object of the specification is a simple means for the driver to observe whether the rear light is working, without leaving the car. This is achieved by a reflector in a tubular shaped housing catching light rays emerging through a slot from the rear light fitting and re-directing them to a mirror in front of the driver's seat. The reflector is fitted to the back of the vehicle. It is emphasised that the patent covers the principle rather than the constructive details described.

No. 513,192. "Improvements in or Relating to Time Switches for Electric Lighting Circuits."

Dewhurst, V., and Wells, F. Dated November 3, 1937.

The specification refers to time switches inserted into lighting circuits to switch "on" the same at a predetermined time and of a type whereby cam means are set manually in conjunction with an indication device on the clock face to release the catch which controls the contact maker. The improvement refers in particular to such switches used on vehicles and aims at their simplification. It consists in its essential parts of a cam member operable by clock mechanism and normally restrained from axial movement, by an element set manually, a spring catch lever dependent on the cam and the contact maker dependent on the aforementioned lever. Operation is effected by the cam member sliding axially on its carrier spindle unlocking the lever and thus permitting the spring urged contact maker to move forward and to close the circuit.

A New Fluorescent Lamp

Consumes 80 watts—yields 32 lumens per watt—affords a "cool" white light and a "shadowless" effect.

On March 1 an entirely new type of lamp was announced by the Electric Lamp Manufacturers' Association, by whom the following particulars are furnished. This 5-ft. 80-watt Tubular Fluorescent Discharge Lamp is the first mains voltage lamp commercially produced which utilises fluorescent powder deposited in the envelope to obtain the greater part of the light. It has certain evident advantages.

The lamp itself consists of a glass tube 5 ft. long and 1½ in. in diameter, internally coated with fluorescent powder and with a two-contact B.C. cap at each end. The low pressure mercury discharge stimulates the powder strongly. About three-quarters of the total light is obtained by fluorescence.

The control gear necessary for this lamp is identical with that for the familiar 80-watt mercury lamp (type M.B./V), and is interchangeable with it, but an additional condenser and thermal switch are required. The latter allows the electrodes to heap up before the discharge starts, and the former suppresses the arc when the bi-metallic switch contacts open. Both are small and are usually housed in the same case as the choke.

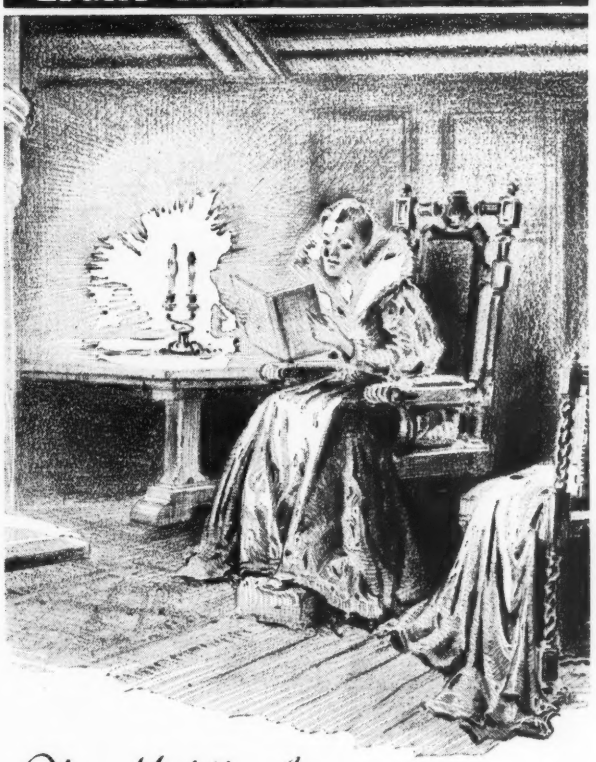
The initial efficiency of the lamp is 35 lumens per watt, or about 32 l.p.w. if choke losses are taken into account. The initial output of the lamp is 2,800 lumens, comparing well with the 2,900 lumens of a 200-watt gas-filled lamp or the 2,680 lumens of two 100-watt lamps. The life is about 2,000 hours.

The total amount of heat generated by the lamp is about one-third of that generated by gas-filled lamps of the same light output, and a lower percentage of the total is emitted in the form of radiated heat. This is of obvious importance in a number of instances. When lighted the lamp is cool enough to handle with no discomfort. The colour of the light is termed "cold white" and is, in fact, very similar to natural daylight. It is stated to show all colours with much greater truth than any previous commercial colour-corrected lamp or fitting with the exception of the CO_2 tube. There is thus available a means of providing high intensities of artificial daylight at a reasonable cost and with much less trouble from heating than formerly. Moreover, owing to the extended source of light the diffusion is exceptionally complete and only very soft shadows are formed.

Since the surface brightness of the lamp is low no elaborate screening devices are necessary. The lamp is also remarkably free from stroboscopic effects. Doubtless a number of ornamental fittings will make their appearance for use with this lamp in commercial interiors, but for industrial lighting all that is necessary, for the majority of purposes, is a simple trough-shaped fitting which can be suspended at a convenient height and which preferably contains also the necessary control gear.

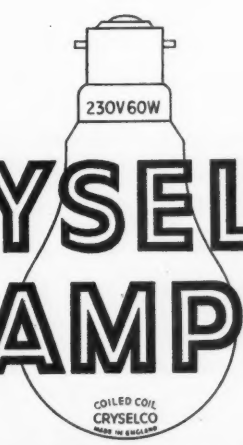
In industrial work this lamp is considered particularly suitable in locations where a high level of lighting is required over a restricted area, and for interiors with low ceilings. It is anticipated that this new lamp will be widely used for lighting benches, machines, inspection areas, assembly bands, textile machinery, drawing offices, and for commercial colour matching. For showcases in commercial interiors where reduction of heat is important these lamps have also an obvious application. To sum up, the new lamp is approximately five times as efficient as a Daylight Blue lamp, and three times as efficient as a gas-filled lamp of the same size. It is relatively cool, has a low surface brightness, and affords even diffusion of soft light. The price of the lamp is 36s. 6d.

LIGHT THROUGH THE AGES



The Middle Ages

Following the Dark Ages and during the advance of learning, domestic illumination was confined almost entirely to candles. These candles were composed of animal fats as other materials were not available at reasonable prices.



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NOTES ON ILLUMINATING ENGINEERING ABROAD

(Specially Contributed—H. L. J.)

United States

Adequate Office Lighting Systems seem to play quite a large part in illuminating engineering in the United States. Independent of the installation described in the February issue of this journal, "Electrical Engineering" has given details of the Drawing Office Lighting Installation at the headquarters of the Consolidated Edison Co., of New York. The guiding principles in this case were the elimination of glare and the provision of about 45 f.c. on the workng plane. With commercially available fixtures this would have meant a load of about 8 watt p. sq. ft. Furthermore, the dissipation of heat from such fixtures would have necessitated air conditioning provisions at an initial cost twice the expense of the proposed lighting system. Accordingly, with the aim of avoiding such expenditure an effort to design a fitting specially suitable for the purpose was made. The bowl type of lamp was chosen as the light source in view of its self-contained mirror which does not suffer deterioration owing to dust collection. The lamp was designed for mounting as close to the ceiling as conditions would permit, and experiments were carried out with louvre constructions. Concentric, metallic louvres were approved in preference to the conventional design of an indirect unit. Amongst the advantages of louvre provision are the minimum (light) intercepting surface offered, and the elimination of dark patches evident to observation from below, the diminution in cleaning necessary, and the optimum heat dissipation. The design finally applied has three louvre rings (maximum dia. 19″) and an overall length of 14″. The wattage per fitting has been fixed at 200, which give 38 f.c. on the working plane. Experiment showed that higher illuminations were undesirable owing to the high reflection off the tracing cloth.

"The Fading of Dyed Textiles by Radiant Energy" is a problem of fresh importance in consequence of the growing application of fluorescent daylight lamps. M. Luckiesh and A. H. Taylor deal with this theme in "Illuminating Engineering" (the journal of the I.E.S.). They refer in this connection to previous experiments made with twenty-five silk ribbons with the object of comparing rates of fading under artificial light and natural daylight. At that time it was found that fading appeared to be directly proportional to the product of f.c. intensity and hours of exposure according to tests with tungsten lamps. Temperatures up to 120° F. did not appreciably effect the process, but further increase to 150° F. certainly did accelerate the rate. Preventing free access of fresh air, one could retard fading. Moisture, however, had no apparent influence. Generally it was found that 75 f.c.-hours of natural sun and skylight and 100 f.c.-hours of light from tungsten lamps produced approximately equal degrees of fading. Now new tests are in progress with various illuminants. including fluorescent lamps. Forty specimens of different colours and different fabrics, gauged as to their fastness by the Association of Textile Chemists and Colourists, have already been exposed for 1,300 hours to an intensity of 100 f.c., and the data available already gives some indication as to the probable results. In general, not much difference can be found in the rate of fading under the two (artificial) light sources. The tungsten lamps seem to produce a somewhat more rapid fading of blue, violet, and purple. whereas the fluorescent daylight accelerates the rate of fading of pink, yellow, and orange. This seems to indicate that the light source which is richest in energy in the spectral region where the dyed textile has the maximum absorption will cause faster fading than light from another source less rich in that region. In any case, the tests, although still in progress, seem to support one conclusion—that any material which shows excessive fading with moderate exposures to artificial light will fade much faster in the very high daylight illumination encountered outdoors. This has a definite bearing on shop windows.

Switzerland.

M. Guanter reports in the "Bulletin de l'Association Suisse des Electriciens" on combined sodium-tungsten lighting units which give an appreciable improvement in colour rendering over pure sodium. The tungsten lamp is preferably to be used in series to the sodium lamp. For the small sodium type of 55 watts a tungsten lamp of 165 volts and 0.92 amp. should be used. The following data in regard to the combination are given: The total flux equals 4,600 lm. (2,850 *plus* 1,750), the total wattage 205, and the efficiency is of the order of 22.4 lm/w. Their application is particularly recommended in workshops handling brass and copper.

France.

A comprehensive survey of lighting in mines is given by M. Armanet in "Electricité." He recalls that in the days of the old Roman Empire oil lamps were used in collieries. In the middle ages pyres and torches were preferred. Later these were replaced by candles in bowls of clay. In 1875, oil lamps were widely in use in France. These lamps, called "les raves" (turnips) presumably because of their shape, were of metal, fully closed except for the holes for wick and air passage. At that time portable and stationary types of oil lamps were most in favour. Reflectors were made of wood and plated with metal foil and the first glass covers just appearing. Fuel was olive, rape or nut oil. Safety Lamp development started with Davy's discovery in 1815, but was much hampered by the decrease in light output. 1850, Mueselier de Liège tried to improve on the device by substituting for wire mesh a glass cylinder, but without success. In 1870, the first electrical safety lamp, in the form of a Geissler tube aggregate, was suggested by Dumas and Benoist. But only round about 1900 did Safety Lamp development reach a stage where legal measures could be taken to suppress the open flame type of lamps. At this juncture the Marsault and Wolf lamps were introduced on a large scale.

The importance of good lighting to the physical health of the miner and as a utility for raising the production was not recognised until much later. Miner's "nystagmus" has now been studied thoroughly and inadequate lighting is regarded as one of its main causes. The disease is described as a kind of nervous fatigue due to long exposures of sharp contrasts and an unnatural angle of the line of vision in consequence of the restricted space available in the working area.

The author then goes into a detailed description of the technical conditions prevailing in mines and lamp constructions as in use to-day. He finally summarises French Government Regulations, according to which all lamps must be approved by the Ministry of Public Works and subjected to severe tests at the "Station d'Essais du Comité Central des Houilleres." One essential condition is the complete elimination of any danger arising through ignition of gases in the event of breakage of the lamp. The new Wolf lamp is mentioned as one of the best solutions. In this case the air driving the generator is first lead into the globe housing the lamp and if the latter breaks will escape to the open, stopping operation of the generator instantaneously. In case the bulb is also broken and the filament still hot the blast of the escaping air will cool down the filament and prevent ignition of the atmosphere.

Older School Buildings Now Preferred!

Illuminating engineers have been called upon to do many things opposed to their natural inclinations since the "black-out" came into force to assist in the restrictions of artificial light out of doors and in the blockage of windows through which the light of day is normally admitted to interiors. The primary aim in designing commercial and industrial buildings, the provision of a maximum window area with a view to securing the highest possible daylight factor, has become an actual drawback—for the greater the window space the more expensive do black-out operations become.

But the crowning absurdity of the present position is surely to be found in the case of school buildings. Strict rules have been laid down for their protection, and modern buildings, with walls consisting largely of glass, require a formidable number of bricks for this purpose. The consequence is that, according to the *Evening Standard*, educationists are actually turning again to the grimy old buildings, which formerly figured on the black list owing to their poor facilities for the admission of daylight!

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NO RATCHETS, PAWLS, SPRINGS, or GEAR WHEELS

The Illuminating Engineering Society (U.S.A.)

Notes on Transactions (February, 1940)

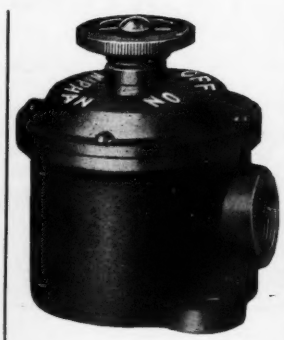
NEWS: Nearly 60 *per cent. of the motor vehicle fatalities* in 1938 resulted from accidents during dusk and darkness, when only about one-third of the driving was done.—The Better Light—Better Sight Programme for 1940 includes *the production of a film* to be shown before local meetings, utilities, electrical leagues, sight saving councils, etc., and *the establishment of a speaker's bureau* to build up a list of capable speakers to inspire talks on lighting subjects all over the country.—The New York University, the Polytechnic Institute of Brooklyn, and Stevens Institute of Technology have inaugurated *a series of postgraduate courses* to enable qualified graduate engineers to study modern research and manufacturing methods in the lighting line while earning credit for Masters' or Doctors' degrees.—*The Lighting Club*, of Miami, has been founded with the assistance of the local I.E.S. Chapter. Its object is defined as "Good Fellowship leading to the advancement of the theory and practice of Illuminating Engineering and the dissemination of knowledge relating thereto."

CONTRIBUTIONS: *Arcs—Their Operation and Light Output*, by W. R. Forsythe. This paper deals with the history and development of the two main species of arcs: carbon and mercury. The electrical input of carbon arcs used to-day for projection and searchlights ranges from 1,100 watts to 18,000 watts, their brightness from 160 candles p.sq.mm. to 1,200 candles per sq.m.m (the sun: 1,650 candles p.sq.mm.), their efficiency goes up to figures of 65 lumens p.watt. The first mercury arc in a commercially useful construction was brought out about thirty years ago by Peter Cooper-Hewitt. The pressure in these lamps was only a fraction of a millimetre. Work on high pressure mercury arcs was only commenced six-eight years ago, and resulted in the now familiar 400 watt and 250 watt types operating at 1.4 atm. Professor Bol initiated researches on the real high pressure mercury arc providing, in its modern form, a 10 mm. arc in a quartz tube of 1 mm. bore with pressures up to 10,000 lb. per sq. in. (water cooled type).

A Simple Graphical Method of Finding Illumination Values from Tubular, Ribbon, and Surface Sources, by E. H. Wakefield. The paper presents a graphical method of solving the more common problems of illumination distribution encountered when using linear and surface sources. Basic tests have first been made in a room of fixed dimensions with line light sources in different combinations and at different heights. Graphs evolved from these measurements provide the means to calculate in advance the illumination to be expected at arbitrarily chosen points of an interior. The maximum difference between calculation and measurement was found to be 4 per cent.

A Precision Flicker Photometer, by Gregory Timoshenko and W. J. Glasson. The instrument operates at low values of illumination of about 0.5 lumen per sq.m., has been built for testing the relative light transmission of samples of small area (1 sq. cm.). The precision of the instrument was estimated to be better than 1 per cent.

Casual Impressions of Lighting Abroad, by W. C. Brown. The article is a summary of observations made during a visit to Europe last summer out of which the following may be quoted: In Holland—apparently in consequence of the "class A" lighting propaganda—wallpaper manufacturers print the respective reflection factors on the back of their products. Paint manufacturers are adopting similar procedure. The Lighting Centre (Knightsbridge, London) is described as the most up-to-date fixture sales-room the author has yet seen. In general luminaires in Europe have a better appearance but are less efficient than those in U.S.A.



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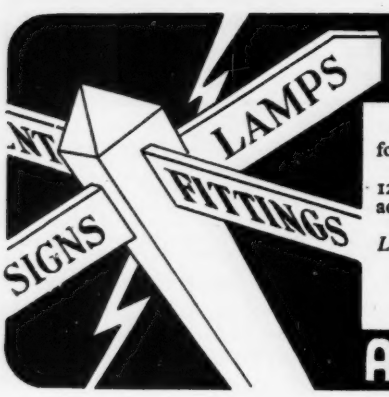

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These terms are equivalent to **half our ordinary advertising rates**, but not less than 12 successive monthly insertions can be accepted on this basis, and amounts are payable in advance.

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Makers to principal research and technical bodies, lamp manufacturers and educational establishments.

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2

ALLOM BROTHERS LTD.
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Specialists in the Science of Modern Lighting, including:

Theatres and Public Halls. Tennis and Racquet Courts.
Pictures and Picture Galleries. Floodlighting, etc.
Decorative Fittings in Glass and Metal.

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4

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and BTH LIGHTING EQUIPMENT

Our Illuminating Engineers will be pleased to advise on any Street, Industrial or Floodlighting problem

THE BRITISH THOMSON-HOUSTON CO., LTD., Crown House, ALDWYCH, W.C.2.

5

SEAMLESS STEEL
LIGHTING STANDARDS
for all requirements
BROMFORD TUBE CO. LTD.
BIRMINGHAM

6

THE REINFORCED CONCRETE LAMP COLUMNS SPECIALISTS.
CONCRETE UTILITIES, Ltd., WARE, Herts.
The Firm with Experience.
Creators of the Popular Avenue Design.

7

Curtis Lighting
COMPANY OF GREAT BRITAIN LIMITED
OFFICES: ALDWYCH HOUSE LONDON W.C.2. WORKS: PONDERS END MIDDLESEX.
Manufacturers of **X-Ray Reflectors**

8

DRAKE & GORHAM LTD.
36, GROSVENOR GARDENS, LONDON, S.W.1
and Branches
For all Lighting Problems—Cinemas, Works, Offices, Public Buildings, Country Houses.

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BI-MULTI AND MULTIPLANE REFLECTORS
Lanterns, Brackets, Columns, Switches and Fuse Boxes, etc., FOR STREET LIGHTING
The Electric Street Lighting Apparatus Co., The Foundry, Canterbury.

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Spun Reflectors, Lamp Casings, Sheet-metal Work, etc.
ELM WORKS LTD. SUMMERSTOWN, LONDON S.W.17. Est. 1903

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ENGINEERING & LIGHTING EQUIPMENT CO. LTD.
SPHERE WORKS,
ST. ALBANS, HERTS.
TELE. 258
DISCHARGE LIGHTING
FITTINGS FOR ALL PURPOSES

12

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PHOTO-ELECTRIC
BENCH, CUBE, STREET and PORTABLE TYPES
FOR CANDLE-POWER AND ILLUMINATION TESTS
EVERETT EDGCUMBE Colindale Works LONDON, N.W.9

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294, GRAY'S INN ROAD, W.C.1.
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CONSULT US ON ANY DECORATIVE, COMMERCIAL OR FLOODLIGHTING SCHEME.
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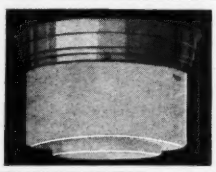

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21

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CINEMA & HOTEL LIGHTING SPECIALISTS

Designers and Manufacturers of Modern Lighting Fitments and Electrical apparatus

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Control of Street, Factory and Sign Lighting.
Smoke Indicator and Recorder.
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ELECTRIC LAMPS *of all types*
"SIERAY" ELECTRIC DISCHARGE LAMPS
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SIEMENS

STORE & INDUSTRIAL LIGHTING EQUIPMENT

CINEMA LIGHTING, etc.

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PLUGS, SOCKETS, TEES, COUPLINGS, TERMINAL SOCKETS AND JOINT BOXES *for every portable and temporary lighting requirement.*

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PATENT SELF SUSTAINING WINCHES FOR ALL PURPOSES

Quick hoisting with little effort
MADE IN TWO SIZES

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Many types of fittings with screened light; also Shop Window Units to Home Office Regulations.

Actual Manufacturers:
STRAIGHT-LITE REFLECTORS, LTD.,
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STRAND ELECTRIC
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SPECIALISTS IN COLOUR LIGHTING and STAGE EQUIPMENT
LIGHTING FOR EVERY OCCASION

THEATRES:EXHIBITIONS
FLOODLIGHTING:CINEMAS
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For every type of GAS LIGHTING

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When you want the best!
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31

"THORLUX"
"OVERLAMP" REFLECTORS
DISCHARGE OR GASFILLED LAMPS
SLIP-IT-ON SLIP-IT-OFF OVER THE LAMP FOR CLEANING

F.W.THORPE LTD. 39,BOLTON ROAD, SMALL HEATH, BIRMINGHAM.
FOR EASY MAINTENANCE—THE BEST

32

WARDLE ENGINEERING Co., Ltd.
OLD TRAFFORD, MANCHESTER, 16.
PRISMALUX DIRECTIONAL LIGHTING UNITS
for stairways, corridors and doorways
Also for A.R.P. Shelters and tunnels.

We invite Enquiries from Readers or Particulars of "Wants" such as might be satisfied by Advertisers in this Directory

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ELECTRICAL REVIEW
FOUNDED 1872

The Complete Technical Journal

Gives practical information and authentic technical commercial news necessary to those who are concerned with the Production, Installation and Maintenance of electrical equipment, Generation and Distribution. Its advertisement pages constitute the most complete Buyer's Guide to all electrical products.

All those interested in illumination matters will find this journal of particular value in its description of fittings and material used in up-to-date installations, giving detailed descriptions of the equipment of important new buildings.

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A pamphlet entitled "The Protection of Windows in Commercial and Industrial Buildings" has been issued by the Air Raid Precautions Department and is available from the Stationery Office (price 4d.).

Lighting in a Tailoring Factory

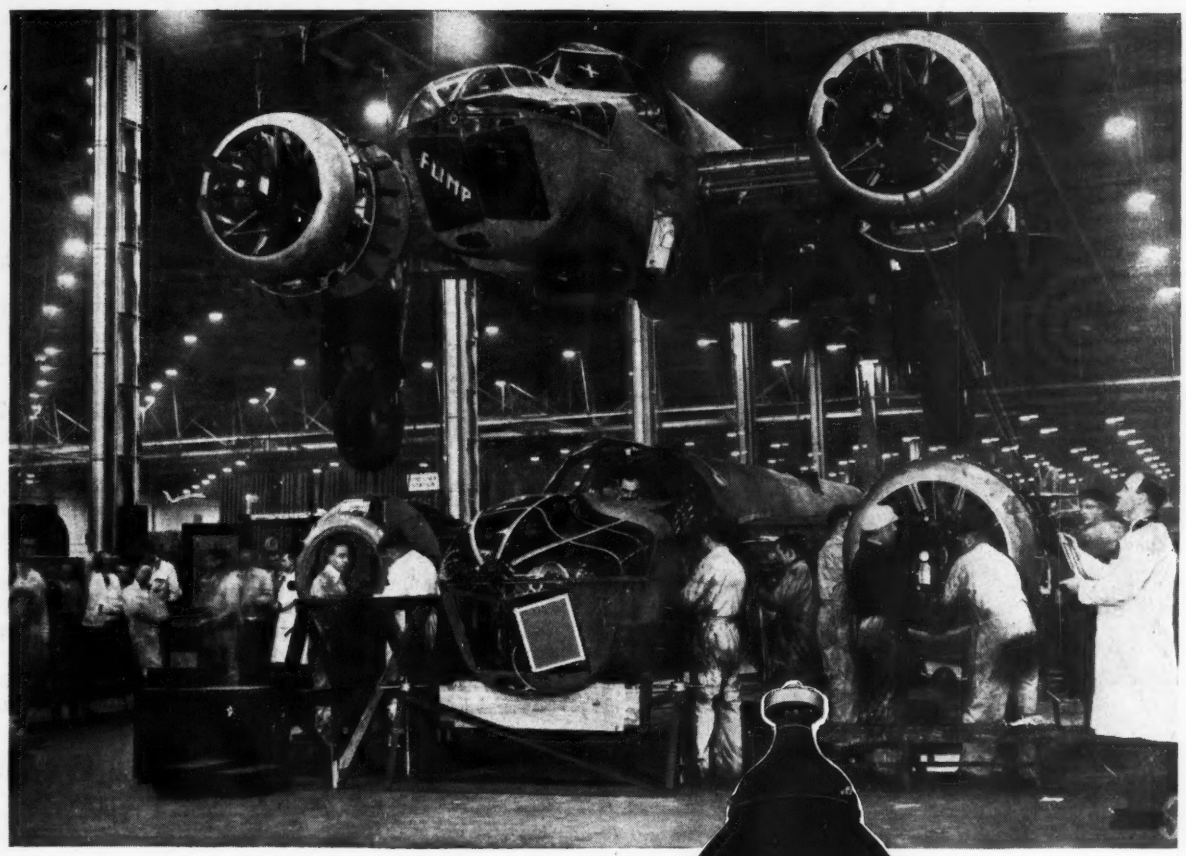
The present activity in the tailoring industry, which is busy making uniforms for the armed forces, adds interest to this photograph of Messrs. Prices Tailors, Ltd., Middlesbrough factory which was completed earlier this year.

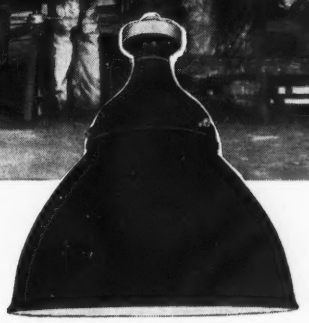
The installation in the cutting room, which is shown here, consists of Benjamin Saaflux Glassteel

Diffusers mounted 10 ft. 6 in. above the floor. The diffused lighting provided by these units, which allow a proportion of the light to illuminate the ceiling, has ensured good visibility for the workers and an absence of shadows. The installation work was carried out by Prices Tailors, Ltd., own staff under the direction of their engineer.

The New Fluorescent Lamps

As we go to press we receive from the British Thomson-Houston Company, Ltd., Crompton Parkinson and Company, Ltd., the General Electric Company, Ltd., and others, leaflets and information relating to the new fluorescent lamps mentioned on page 51. We shall make fuller reference to these data in our next issue and illustrate types of reflectors for the new lamps and examples of installations in which they are in operation.





THE HOME FRONT NEEDS GOOD LIGHTING

Our armed forces rely upon the home front to support them in the war effort and it is only by maintaining good working conditions, of which good lighting is one of the most important, that this can be done. Make sure that the workers' lighting is good enough. The Benjamin Electric Ltd. with their unrivalled knowledge and experience can assist and advise you regarding any lighting problem.

THE BENJAMIN ELECTRIC LTD.

BRANTWOOD WORKS · TOTTENHAM · LONDON · N·17

THE PROGRESS OF THE SCIENCE OF LIGHTING

Some years ago we introduced the term **"CONTROLLED LIGHT"** to represent our methods of providing **EFFECTIVE, EFFICIENT AND ECONOMICAL** lighting.

These methods were based on the patented inventions and the specialised knowledge and experience of Mr. G. V. Downer and our pioneer efforts have met with such continuous and growing success that now we are known all over the world as the leading experts on artificial illumination, and the term "CONTROLLED LIGHT" has been adopted by many others and become quite familiar.

Our primary concern has always been, simply, **GOOD LIGHTING**, perfectly suited to its purpose.

Secondly, we aim at giving this result **IN THE MOST EFFECTIVE AND EFFICIENT MANNER.**

Thirdly, we make our equipment **AS ECONOMICAL AS POSSIBLE** both in installation and still more in upkeep.

INDIRECT LIGHTING IS THE IDEAL for practically all purposes, being evenly diffused, glareless and shadowless, like North skylight, and we have been strikingly successful in providing this at A FRACTION OF THE RUNNING COST previously thought unavoidable.

THE G.V.D. SYSTEM OF CONTROLLED LIGHT is equally suitable for all types of building and all purposes and applies equally to direct or indirect, exterior or interior lighting.

A COTTAGE CAN HAVE AS GOOD LIGHTING AS A PALACE and should, since human eyesight is essentially the same everywhere.

Consequently we do not give a palace better lighting than a cottage, but we adapt our equipment to its surroundings and naturally we should not put a fitting designed for a cottage into a palace.

Our equipment can be as simple and inexpensive or as ornamental and elaborate as desired and can be designed to harmonise with the architecture, furnishing or decoration of its surroundings.

In spite of the war we are still continuing to do good business, both in this country and in many parts of the world.

G·V·D

CONTROLLED LIGHT

Aldwych House, Aldwych, W.C.2

Telephone Holborn 7277-8

A Fluorescent Lighting School

Readers will be familiar with the admirable courses on illumination which were organised at the E.L.M.A. Lighting Service Bureau in this country for a number of years up to the outbreak of war. In the United States such courses have been even further developed. It is, however, a rather surprising indication of the tendency to specialisation to find an account of a "Fluorescent Lighting School" organised by the Chicago Lighting Institute. The subject is, doubtless, a very popular one. The attendance was a record, and the original one-day course had to be extended to three days. There is, in fact, a good deal of room for education in this field. Successful installations demand a certain amount of care: for example in contriving that the uncomfortable "luminous haze" produced by ultra violet light impinging on the eyes is eliminated, and in designing pictorial devices to take full advantage of the possibilities of variety of colour and the creation of "life" and contrast that fluorescence affords.

National "Safety First" Association

Forthcoming One-Day Conference

In view of war-time conditions, the National Safety First Conference will this year be confined to one day, and will take place on May 17 at the Connaught Rooms, Kingsway, London, W.C.2. The Rt. Hon. Lord McGowan will preside at the annual general meeting, which will be followed by an address by the Minister of Transport, and a discussion on War-Time Measures for Road Safety, divided into two sections (a) Engineering and (b) Regulation. At the subsequent luncheon an address is to be delivered by Sir John Anderson, Minister of Home Security, on War-Time Safety Measures affecting Educational Authorities, Industrial and Transport Undertakings. No doubt the opportunity will be taken to comment on the effect of the "black-out" on street accidents and on the value of the best war-time street lighting that can safely be permitted in the present circumstances.

Overhead Lighting in a Factory

The picture above shows the Radicon Worm Reducer assembly department in the works of David Brown and Son, Ltd., Huddersfield. For this process a high illumination and well-distributed light are essential. The overhead lighting, which was planned by Benjamin Electric, Ltd., utilises 1,000-watt lamps in concentrating reflectors, giving an average illumination of 15 ft-c.